Aeroallergens & Environmental Control

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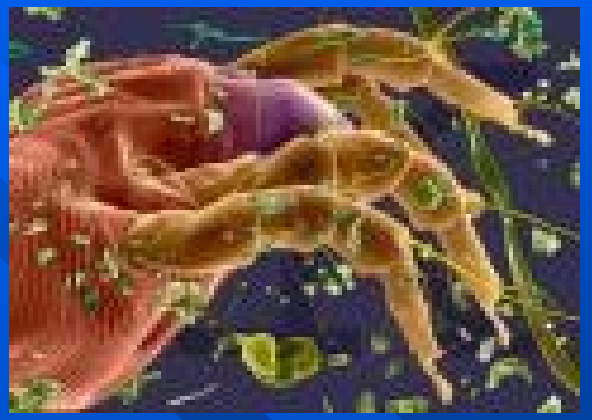
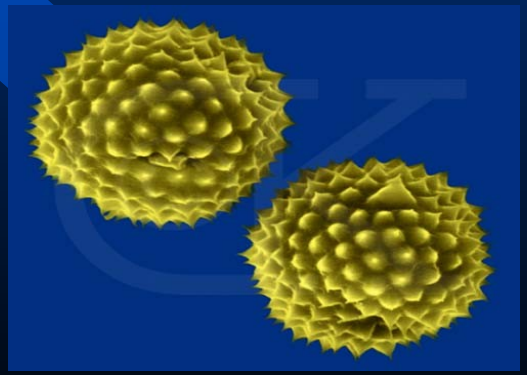
AEROALLERGENS

- Airborne particles
  - Proteins or glycoproteins sized 2-60 μm
- Impact eyes, nose and lungs
- Particles sized <5 μm make it to the terminal bronchioles

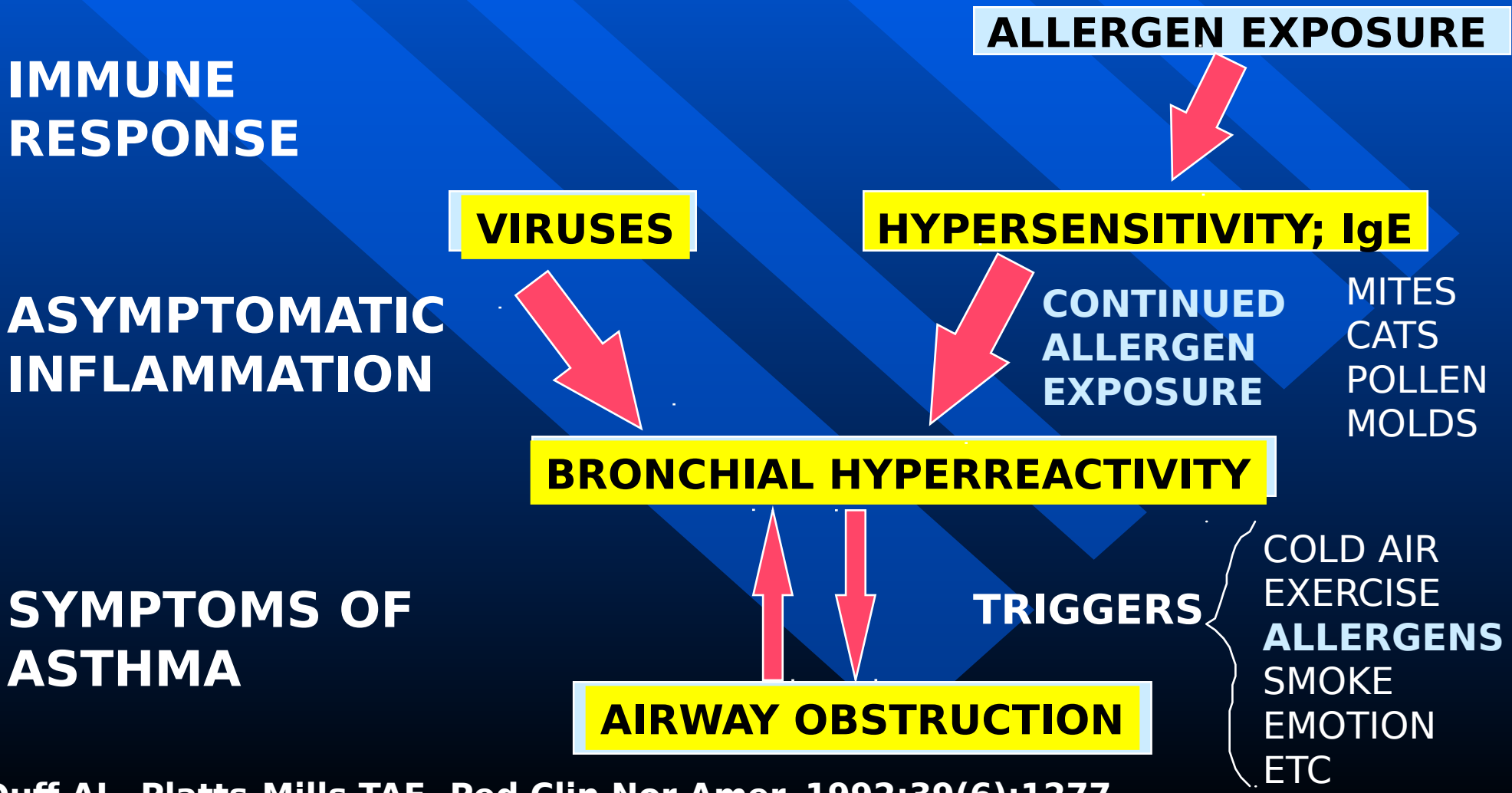
Allergic Rhinitis



- Perennial Allergic Rhinitis
  - Most common cause is the dust mite
  - Other frequent causes include cats & dogs
- Seasonal Allergic Rhinitis
  - Grasses, trees & weeds



HOW ALLERGEN EXPOSURE CONTRIBUTES TO ASTHMA*

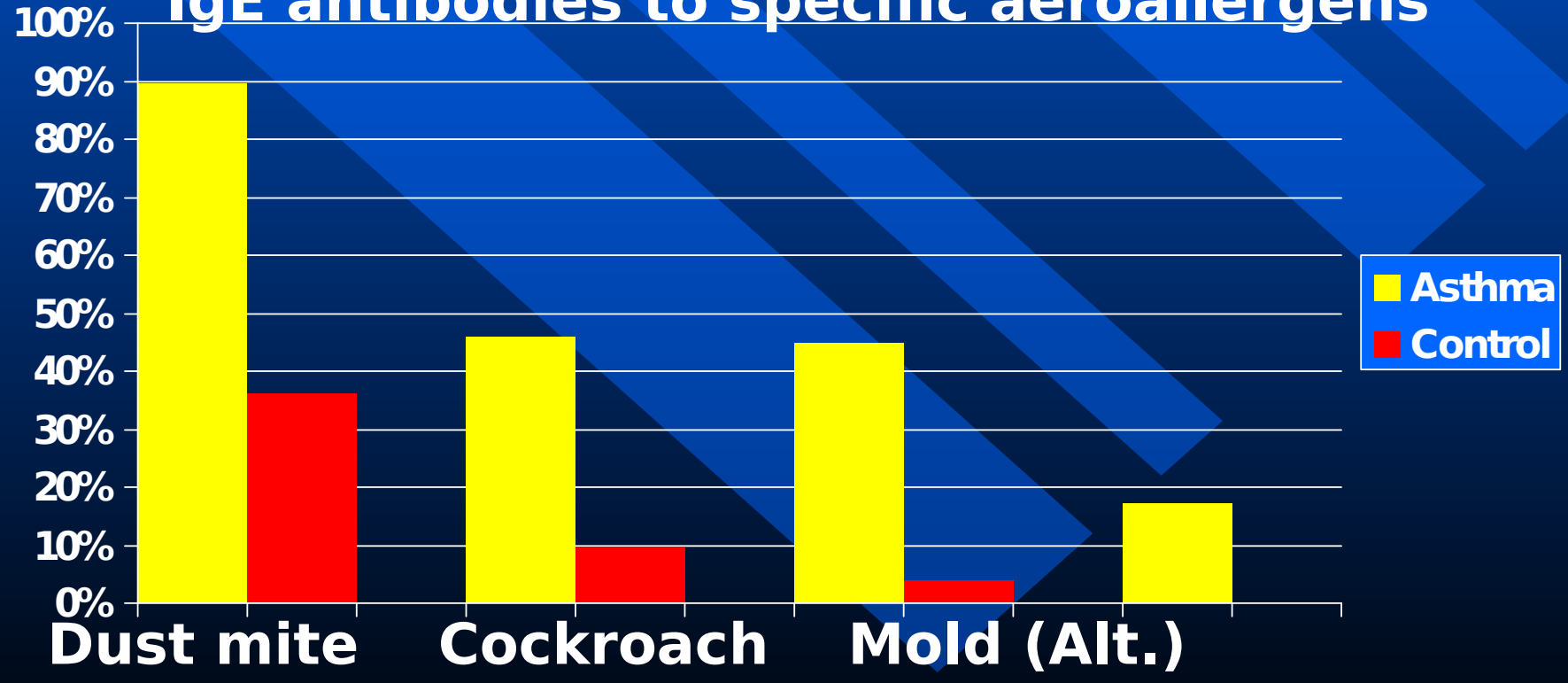


*Duff AL, Platts-Mills TAE. Ped Clin Nor Amer. 1992;39(6):1277.

AEROALLERGEN SENSITIZATION AND ER VISITS FOR ASTHMA: CHILDREN

29 children seen in ED with acute asthma age 3-16 years

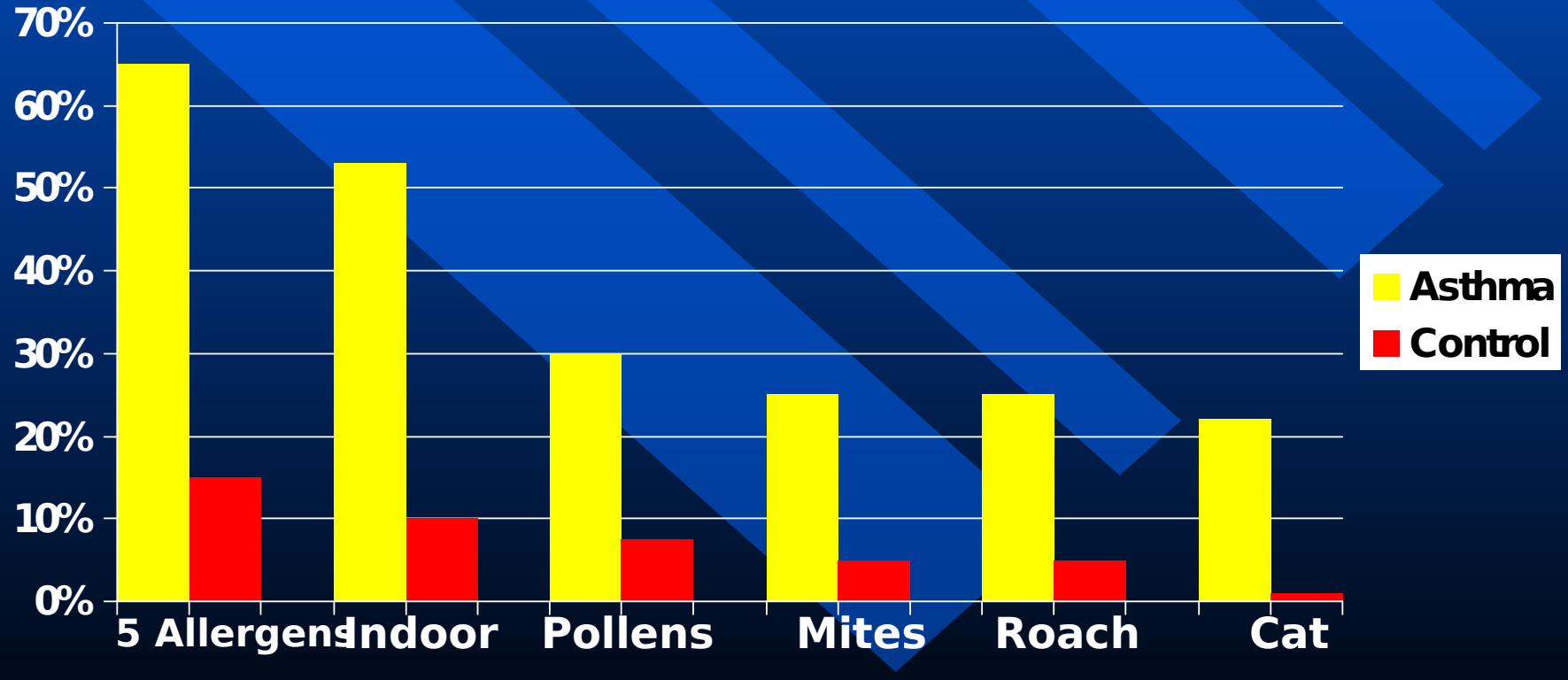
IgE antibodies to specific aeroallergens



Nelson RP et al. JACI 1996;98:258.

AEROALLERGEN SENSITIZATION AND ER VISITS FOR ASTHMA: ADULTS

67 Patients with acute asthma age < 50 years
IgE antibodies to specific aeroallergens



Pollart et al, JACI, 83;875-82 (199)

Overview of Allergens

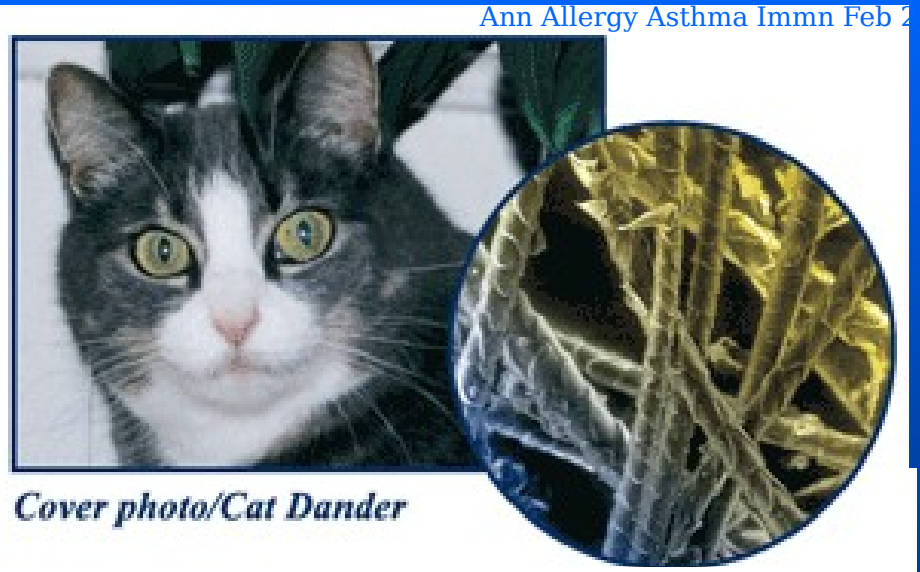
- Indoor Allergens
- Outdoor Allergens

INDOOR ALLERGENS

- Dust mites, animals, molds, cockroach
- Thought to play an increasing role in asthma morbidity due to
  - more energy efficient home construction
  - spending more time indoors

The Cat…

Ann Allergy Asthma Immn Feb 2



Cover photo/Cat Dander

Allergen

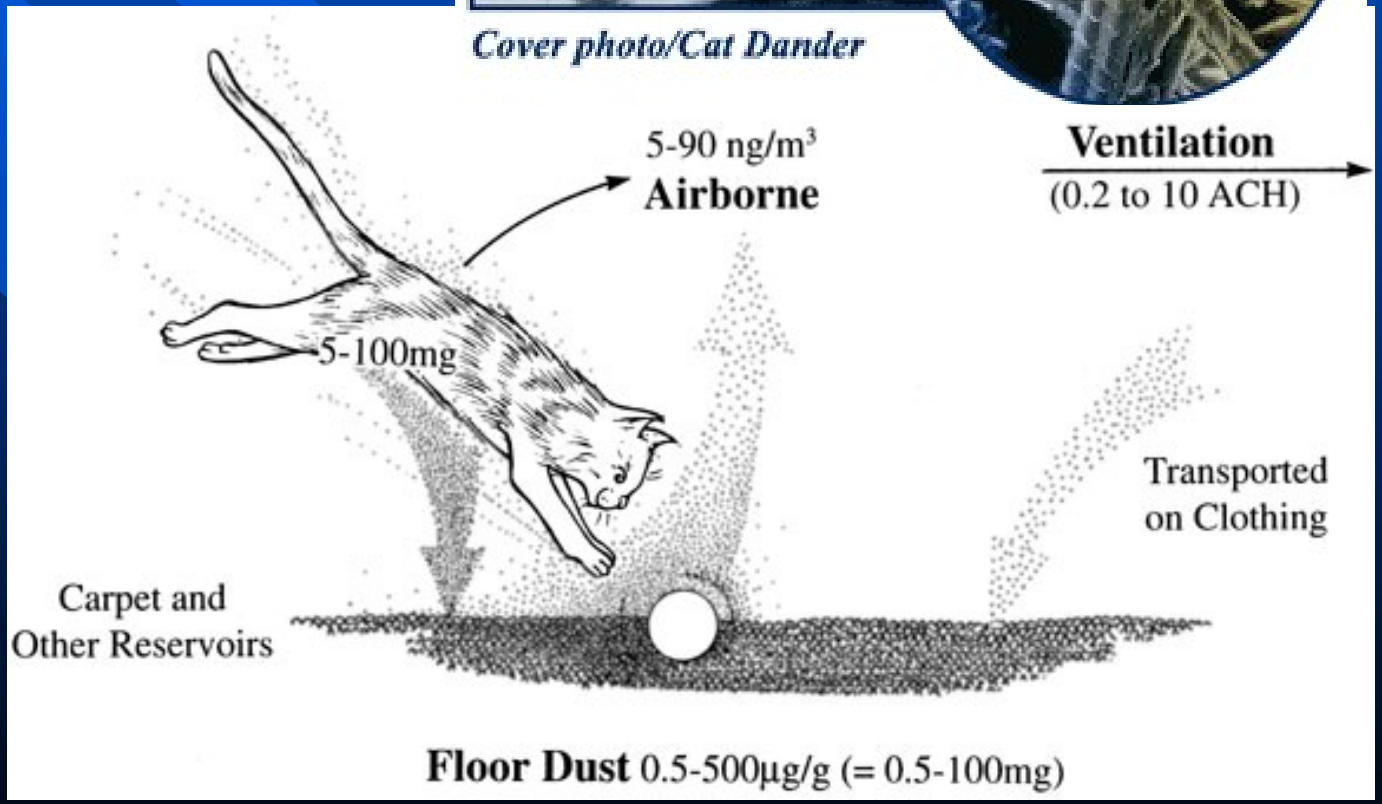
Fel d 1

Origin

Sebaceous glands & saliva
Produces ≈ 5mg/day

Characteristics

Remains airborne without disturbance
Persists 4-6 months after pet removal

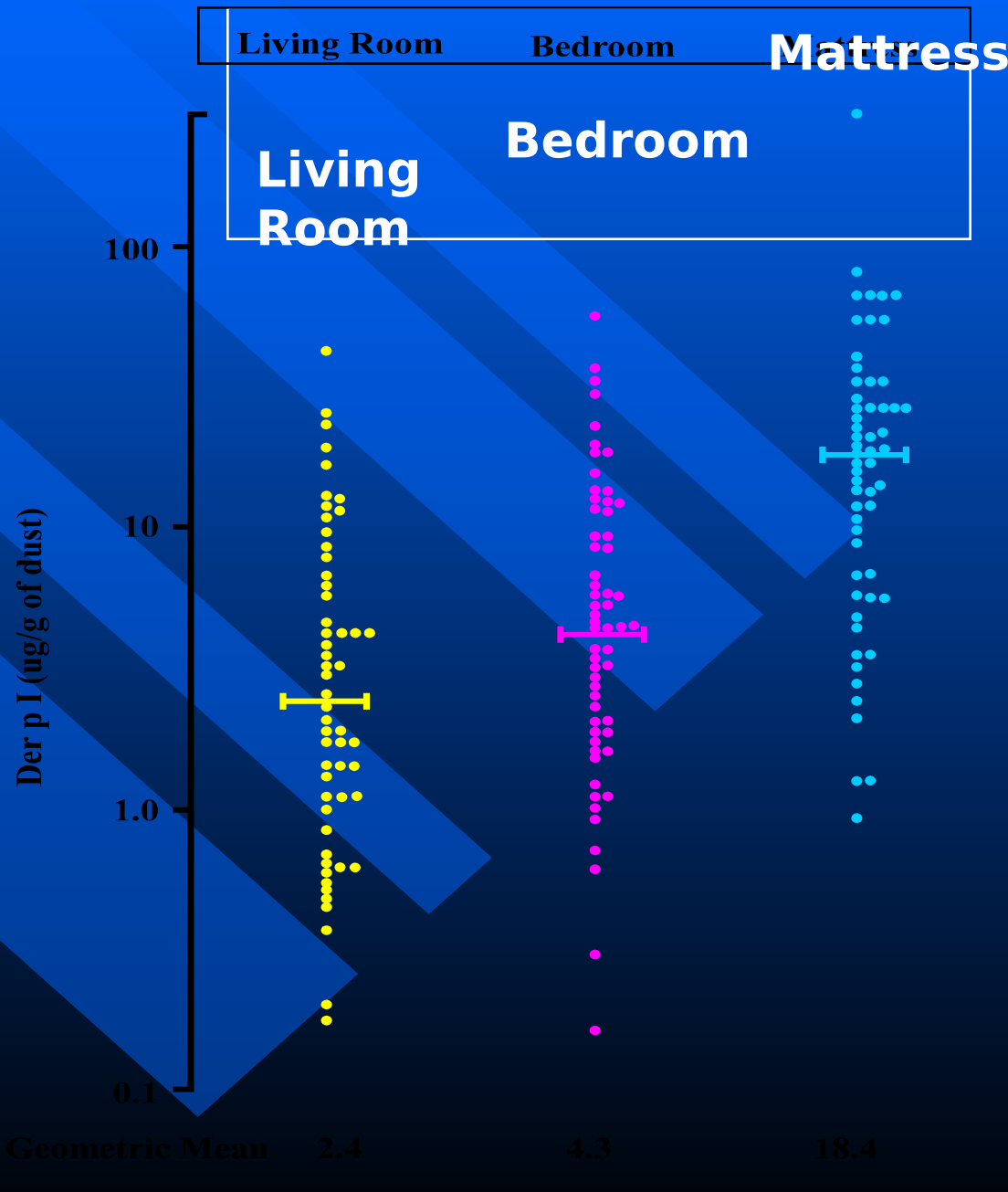


Dynamics of cat allergen JACI Nov 200

DUST MITES
(Dermatophagoides pteronyssinus & farinae)

- Free-living organisms
- Primary food source: human skin scales
- Cannot imbibe water, must absorb it from the atmosphere: need >50% humidity
- Photophobic
- Cannot survive temps >130˚ F

LEVELS OF DUST MITE IN THE HOME

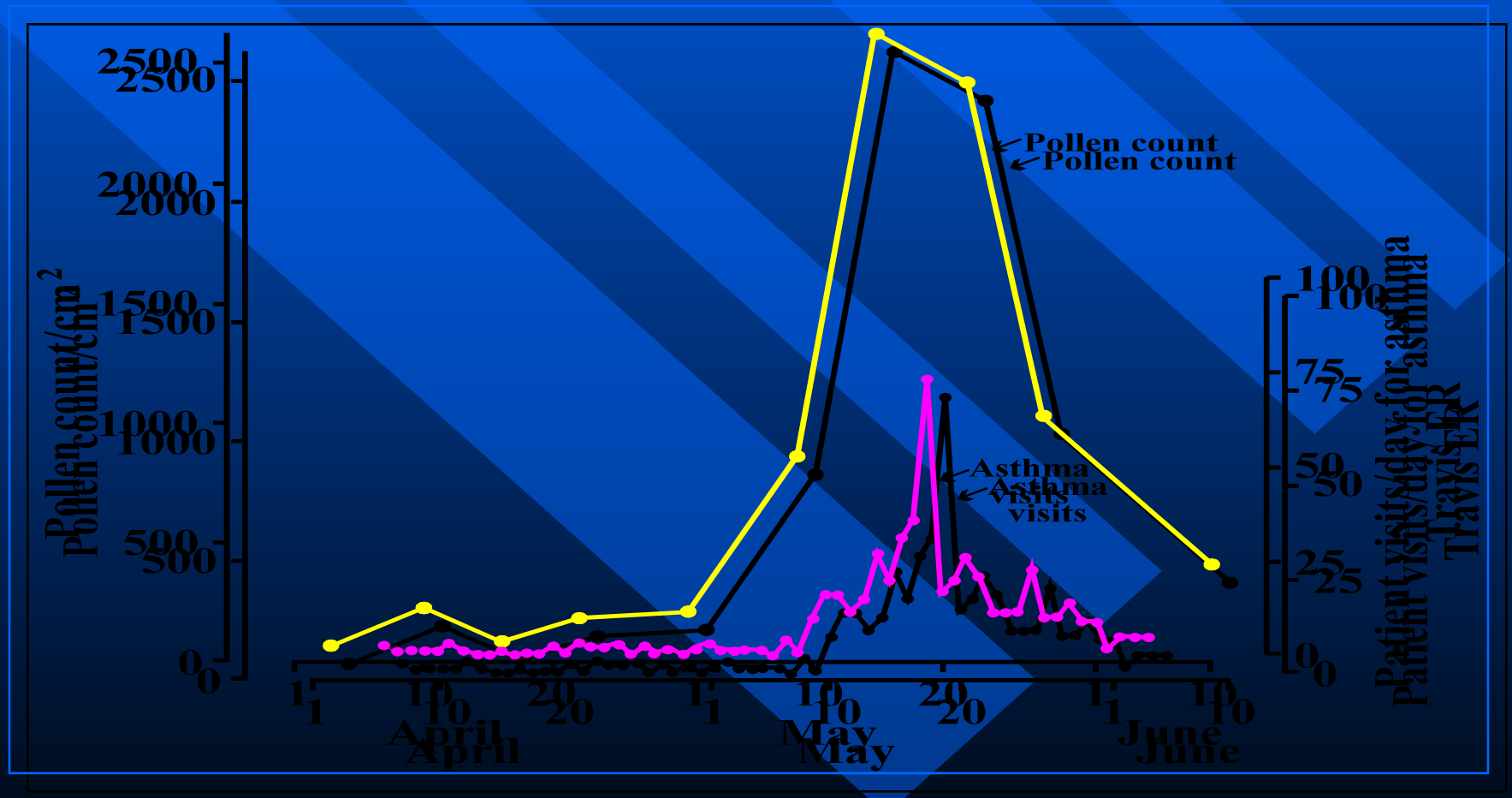


Sporik R, et al. Exposure to house-dust mite allergen (*Der p* I) and the development of asthma in childhood. NEJM. 1990;323:502-7.

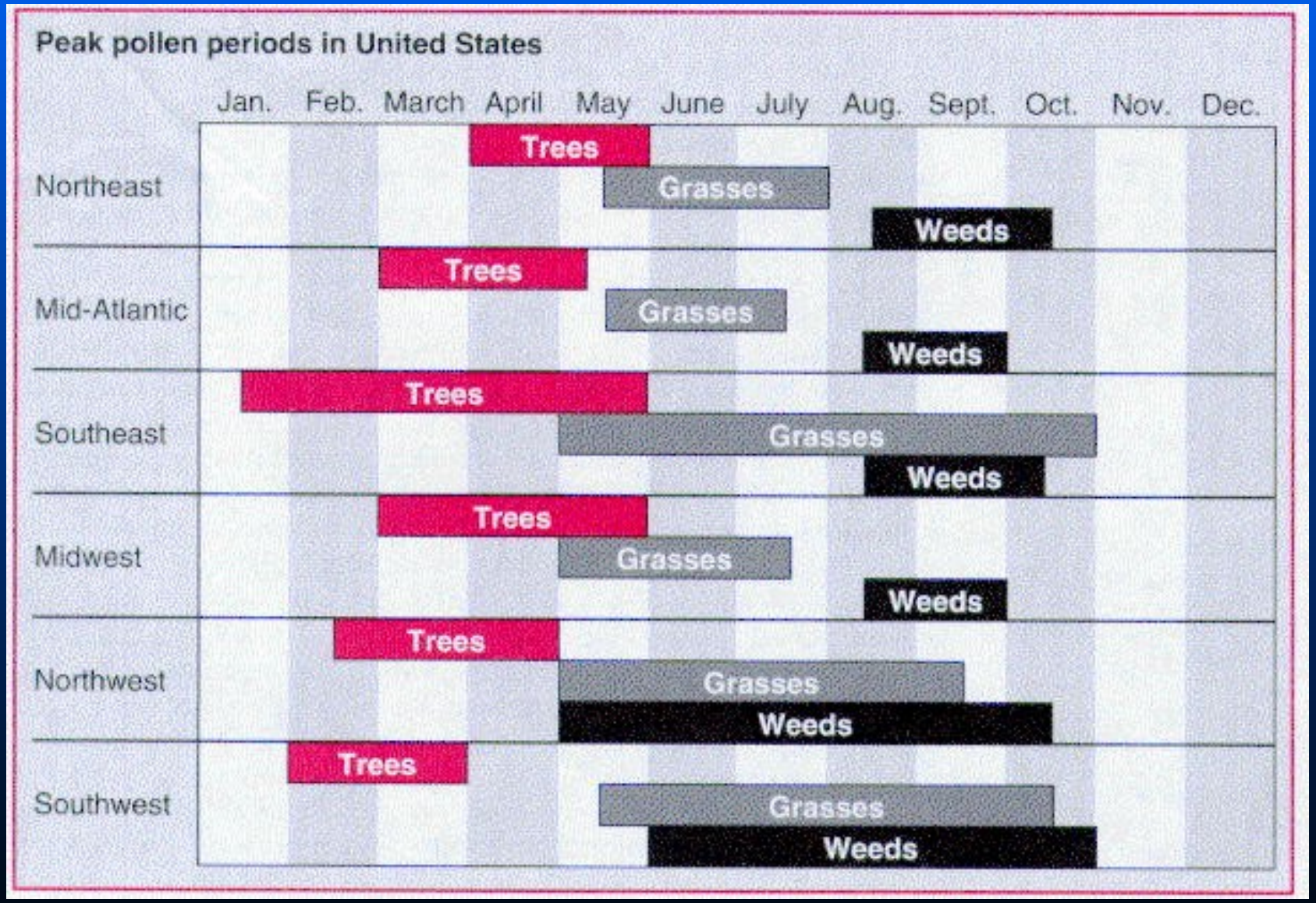
OUTDOOR ALLERGENS

- Pollens of trees, grasses, and weeds
- Molds (Alternaria & Cladosporium)
- Effects on airway hyperresponsiveness ‘synergize’ with air pollutants (NO_2, etc.)

GRASS ASTHMA: POLLEN COUNT VS. ER VISITS



Pollart SM, et al. J Allergy Clin Immunol. 1988;82:224:30.


Peak pollen periods in United States
Jan.
Feb.
March
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Northeast
Trees
Grasses
Weeds
Mid-Atlantic
Trees
Grasses
Weeds
Southeast
Trees
Grasses
Weeds
Midwest
Trees
Grasses
Weeds
Northwest
Trees
Grasses
Weeds
Southwest
Trees
Grasses
Weeds

Distribution of pollen in the US

- What grows where…

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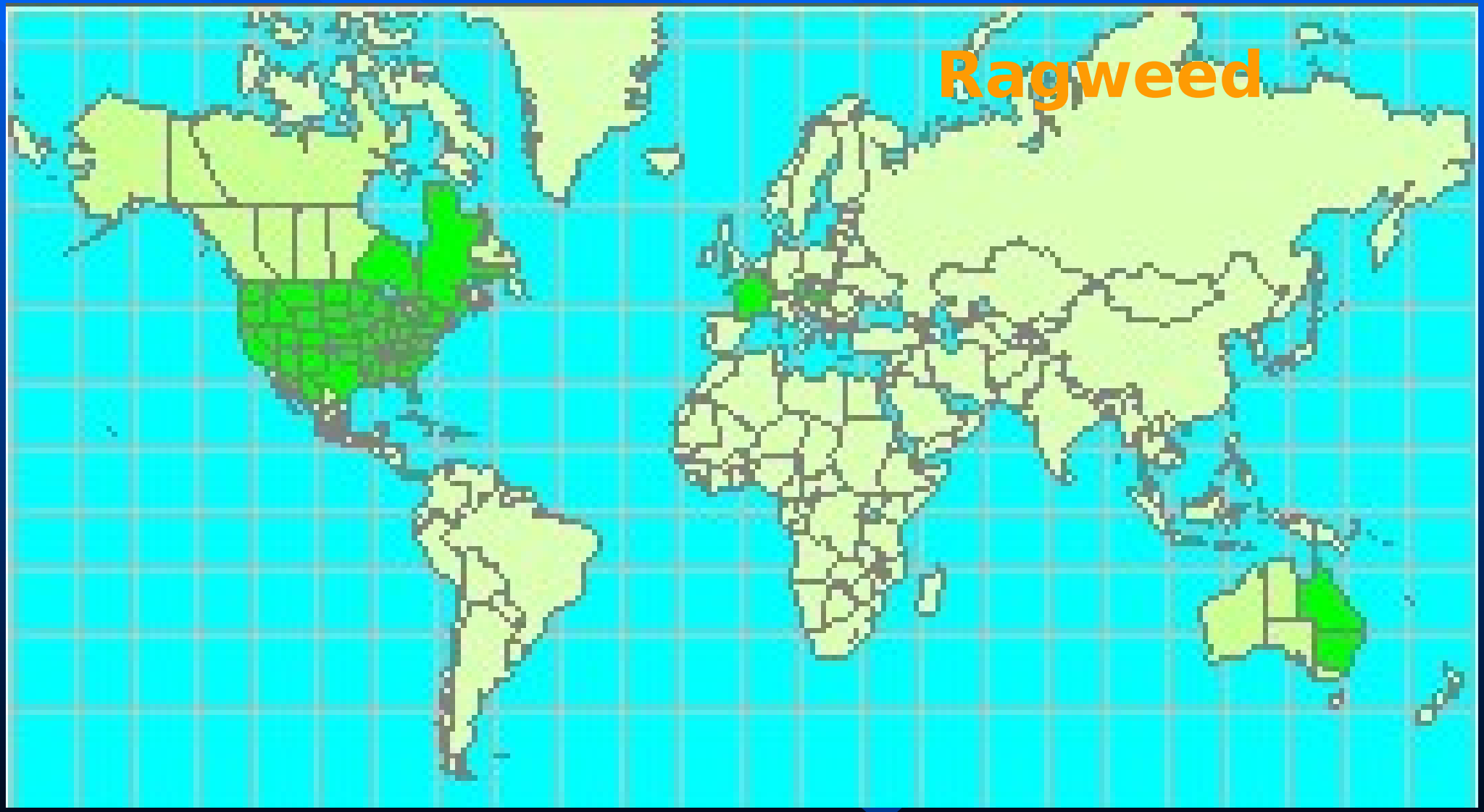
Ragweed


Ragweed

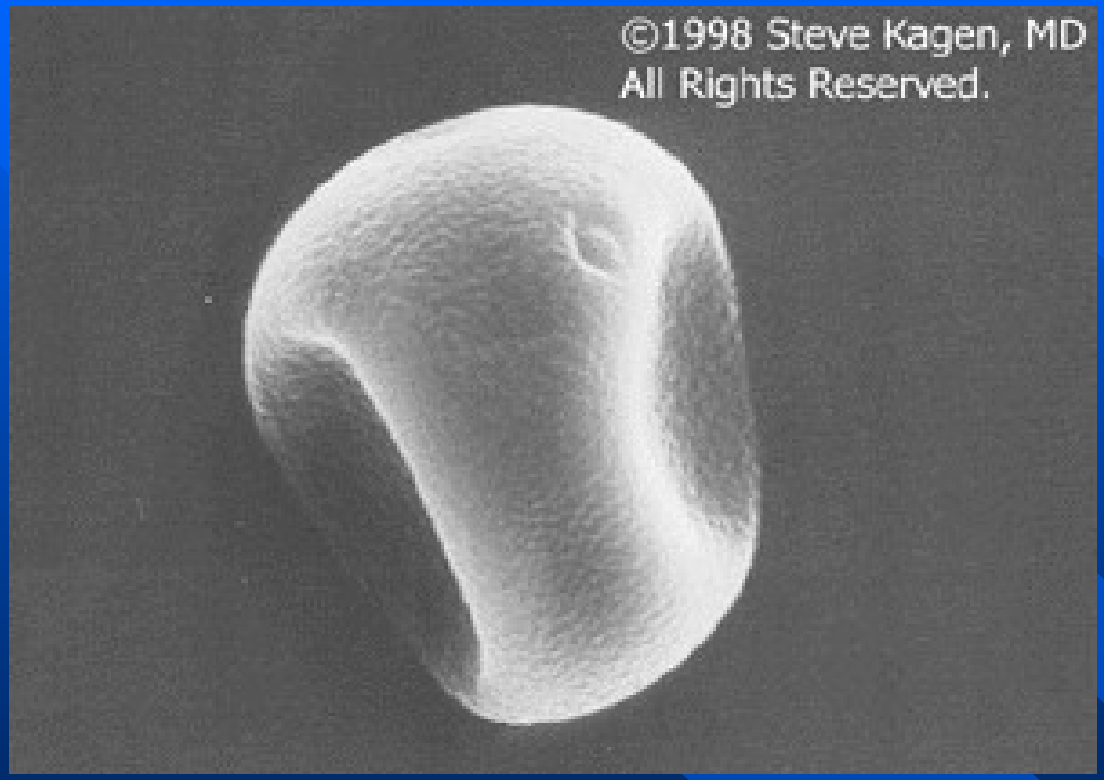
The Oral Allergy Syndrome

- The oral allergy syndrome occurs in 30-70% of patients with pollen allergy[1]
- Symptoms develop almost immediately after the mucosa of sensitized individual comes into contact with certain foods
- Hypersensitivity is likely due to cross reactivity between pollens and foods

[1] Food Allergy: adverse reactions to foods and food additives, 2nd edition, Metcalfe D, Sampson H,
Simon R. Blackwell Sciences , 1997

Cross-reactivity Between Pollen and Food

- Ragweed → banana, cantaloupe, melon, and watermelon
- Birch → apple, cherry, celery, hazelnut, pear, and peach
- Mugwort → apple, carrot, kiwi, orange, peanut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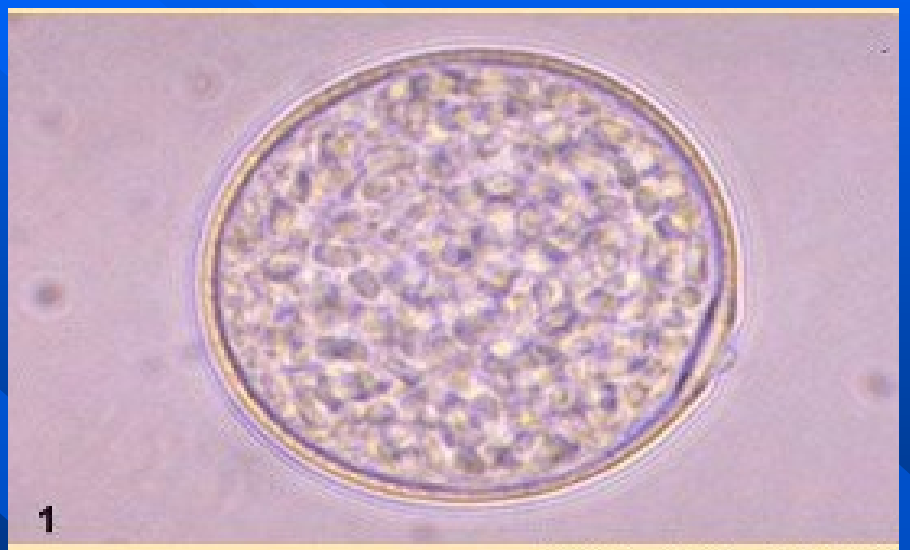
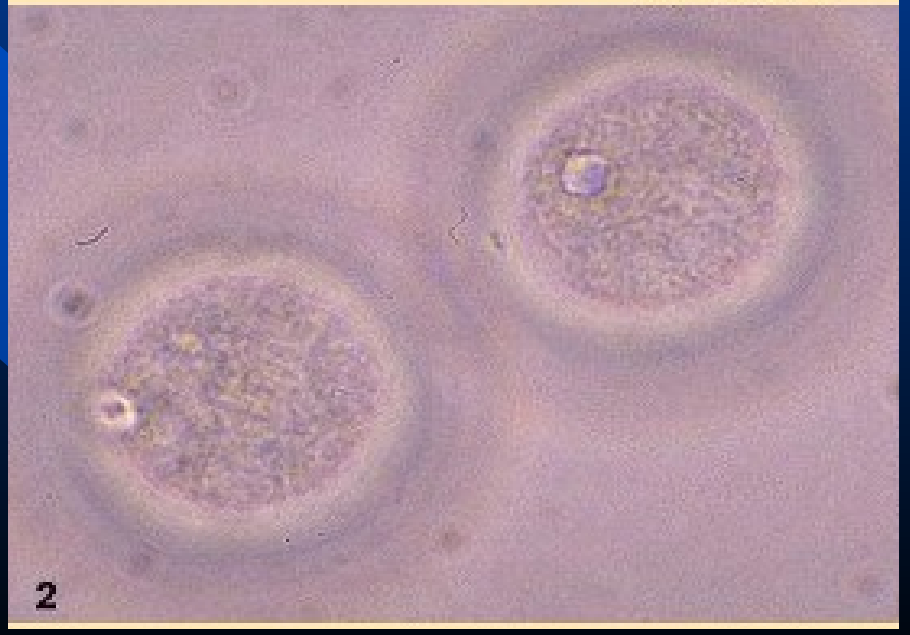
Timothy Grass

Timothy



20 microns

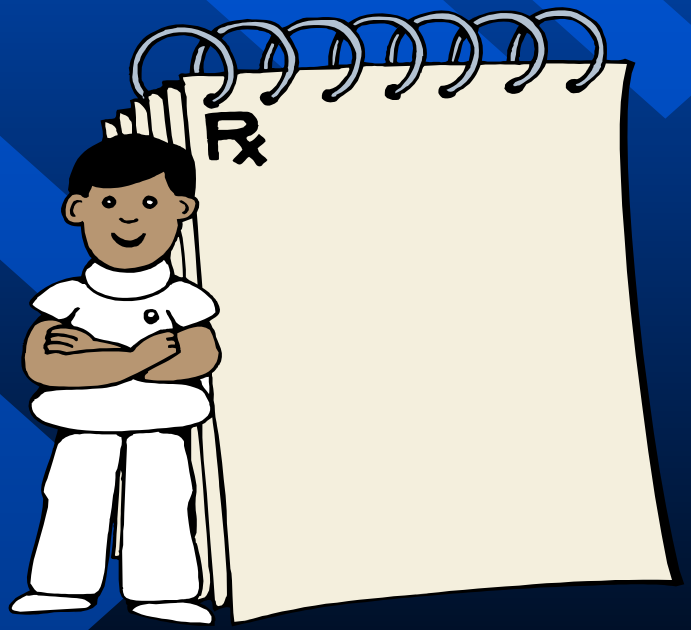


Kentucky Bluegrass

Kentucky Bluegrass

Treatment

1. Environmental control
2. Pharmacotherapy
3. Immunotherapy



Avoidance

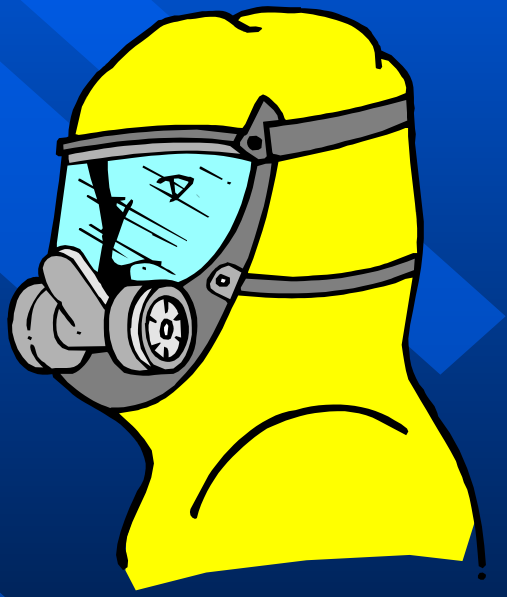
Filtration of Inspired Particles

- Inhaled particles may be deposited in the respiratory tract by a variety mechanisms
- Filters
  - Nose hairs (vibrissae)
    - » Remove most particles > 10-15 μm diameter
  - Nasal septum & turbinates
    - » Large surface area
    - » Particles >10 μm removed by impaction

Filtration of Inspired Particles

- Tonsils & adenoids
  - »Immunological defense against biologically active material
- Trachea & bronchi
  - »Few particles larger than 10 μm present
- Smaller airways
  - »Sedimentation of particles 2 - 5 μm in size

Environmental control



1. Outdoor allergens
   - Overall, little that can be done

2. Indoor allergens
   - Very efficacious. . . if patient is compliant

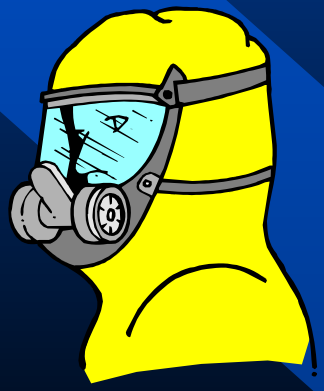
Seasonal Environmental Control:
Pollens

- Keep windows closed at night
- Use air conditioning with filters
- Keep car windows closed when traveling
- Stay indoors when the pollen count is high
- Don’t hang laundry outside to dry
- Take a vacation during the height of the season

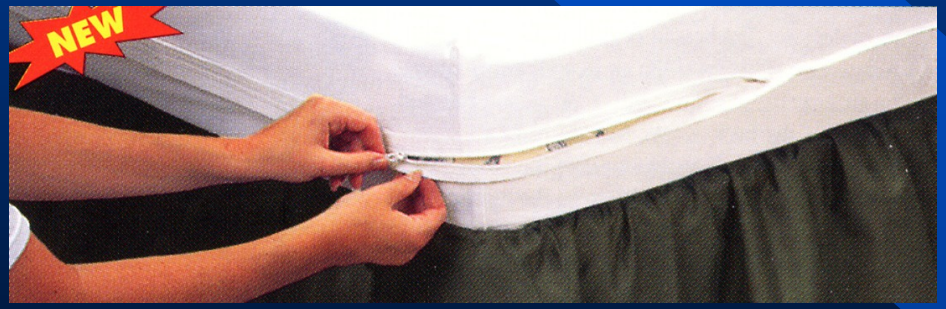
Environmental Control

ALLERGY RELIEF BEDDING
CleanAir
COTTON BLEND ZIPPERED 9" MATTRESS COVER
Designed for people suffering from Asthma, Eczema and other dust related allergies, or for families who value a healthier way of living and more restful way of sleeping.
• Unique breathable membrane forms an effective barrier against dust mites and other harmful allergen particles.
• Captures more then 99.5% of particles 8 microns and larger.
• Laminated to CleanAir urethane membrane.
• Allows moisture vapor to pass through.

- Major emphasis on perennial exp
- Dust mites
- Pets



The Dust Mite



Your Bedroom, the "Allergy Safe" Zone

House Dust Mite

House Dust Mite

Avoid heavy cloth drapes-use shades or vertical blinds

Use mite-proof pillow, mattress, box spring and comforter encasings

Wood, leather or vinyl furniture is best

Use filters over incoming vents to stop dust

Check humidity often with an accurate gauge

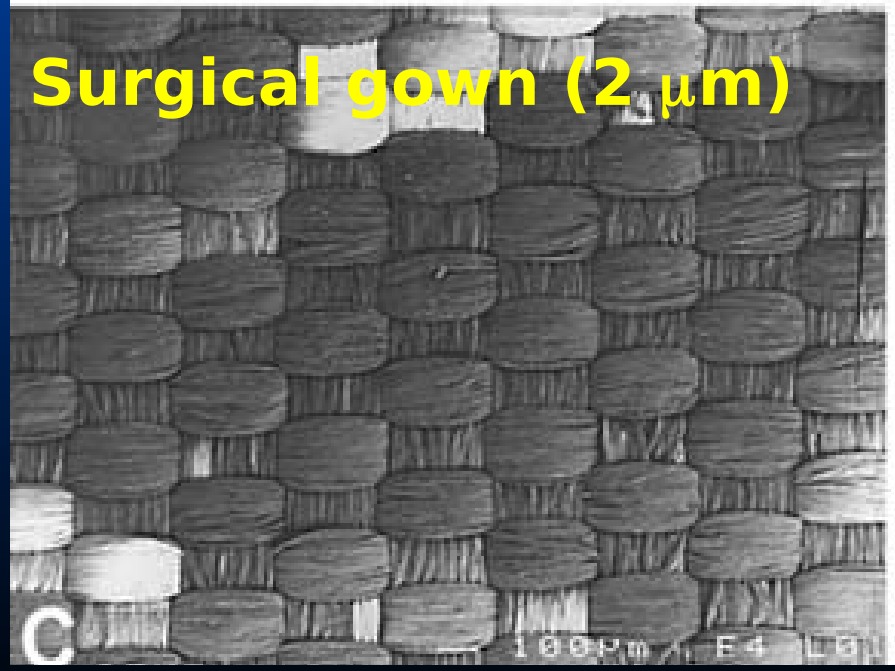
Air condition or dehumidify to 50% or less humidity

Dehumidifier

Wash bedding every two weeks in hot water and for extra protection use de-mite laundry additive

Use throw rugs instead of carpeting or treat carpeting with an anti-dust mite spray or powder

Remove airborne allergens with a powerful True HEPA air cleaner – especially if you are allergic to pet dander, pollen or mold



JACI Nov 2000

Dust Mite Control Measures: Essential

- Goal - Allergen Avoidance
- Encase pillows and mattress in allergen-impermeable cover
- Wash all bedding (bed linens and blankets) in >130˚ F water weekly

JACI 2000;105(6):S610-615

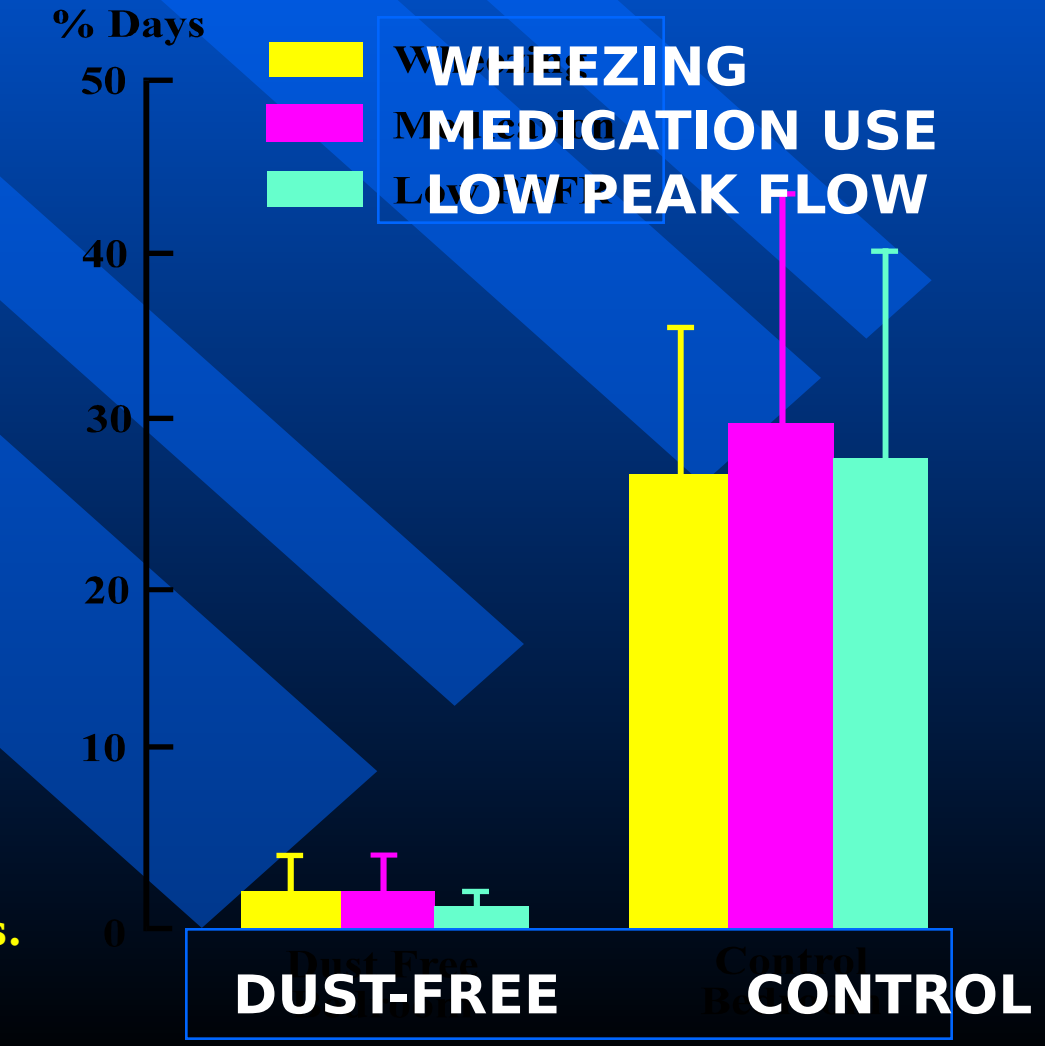
Dust Mite Control Measures: Additional

- Remove carpeting
  - Wash area rugs or place in sun weekly
  - Tile or hardwood floors
- Dehumidify (<50%)
- Minimize ‘dust collectors’
  - Remove stuffed animals from room
- Frequent vacuuming with HEPA filter

JACI 2000;105(6):S610-615

EFFECT OF DUST-FREE BEDROOM

- 20 allergic asthmatic children.
- 1 month of environmental control vs. standard bedroom



Murray AB and Ferguson AC. Pediatrics. 1983;71:418-22.

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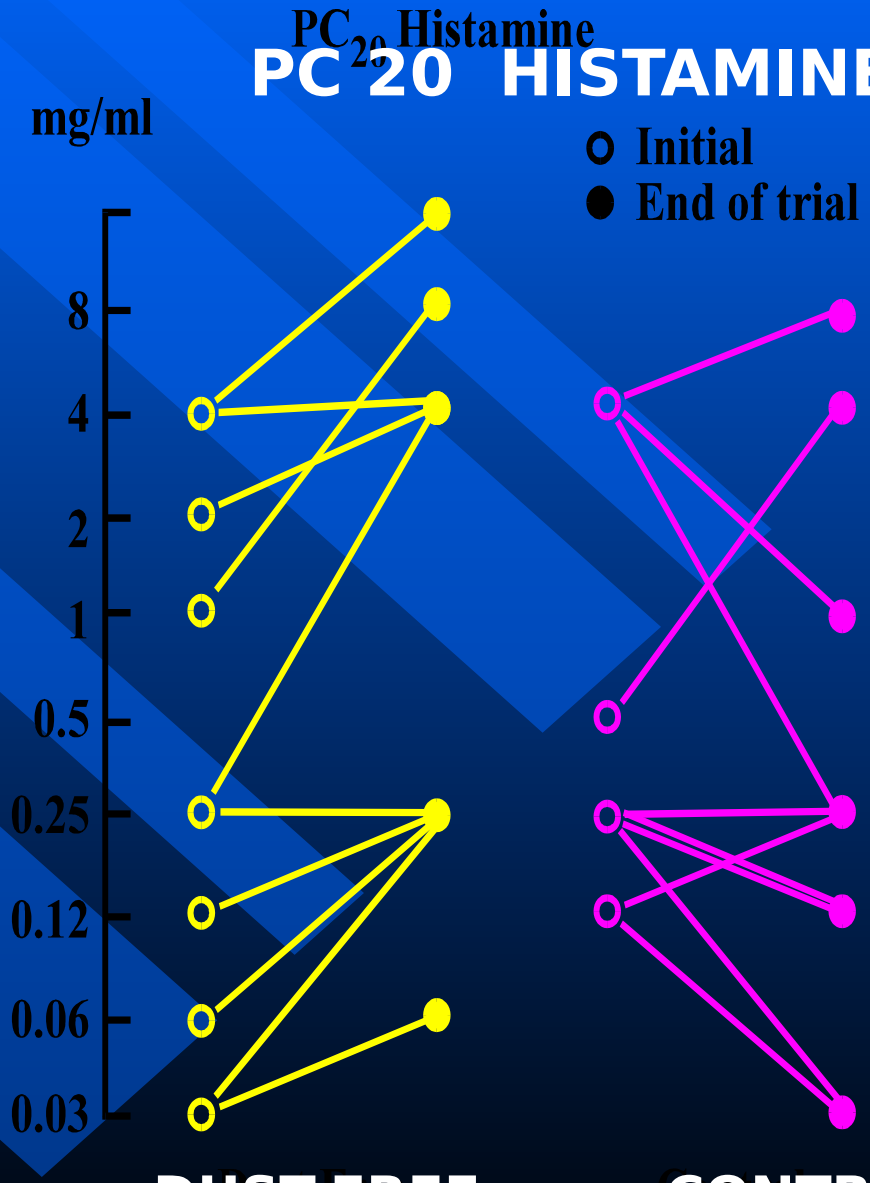
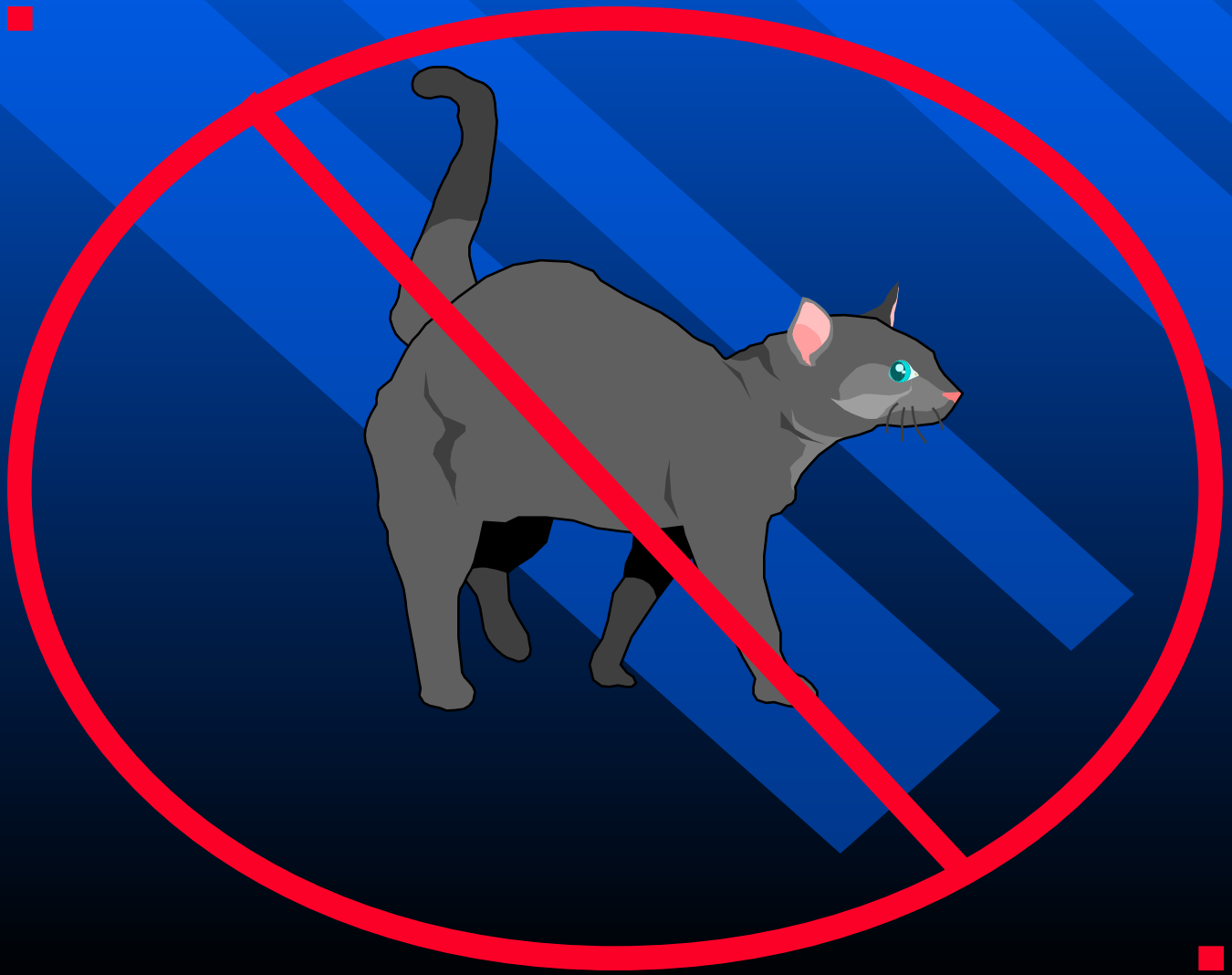


Murray AB and Ferguson AC. . Pediatrics. 1983;71:418-22.

Environmental Controls

Pets



The Pets

- Most appropriate recommendation
  - Find the pet a new home
- If unwilling to remove pets
  - Keep them outdoors
  - Restricting to one part of house not effective
- Remove carpets and use covers on bedding
- HEPA filter in bedroom
- Wash pet at least <u>twice</u> per week
  - Each washing can remove 3 mg of allergen

Allergen levels can be reduced but clinical endpoints may not be improved JACI 2001;107(3):S414-419

Cockroaches

- Exterminate with pesticides
- Vacuum and wash thoroughly
- Eliminate food and water sources
- Wash dishes daily and store trash outside
- Seal cracks and portals of entry

JACI 2001;107(3):S422-423

Fungal Avoidance

- Prevent spore infiltration
  - Examples: Aspergillus & Penicillium
  - Close doors, windows and use air conditioning
- Repair water leaks
- Clean and remove contaminated materials with fungicides or bleach
- Regular maintenance of heating and air conditioning systems

JACI 2001;107(3):S403-405

Fungal Avoidance

- Avoid areas of heavy mold growth
  - Basements, compost piles, fallen leaves/cut grass
- Limit indoor houseplants
- Do not place carpet over slab
- HEPA filters
- Dehumidify (<50%)

Any Questions ?